

CLAIMS

I claim:

1. A capacitance detection device that reads asperity  
information for a subject surface by outputting a detection signal  
5 corresponding to the capacitance formed between the subject  
surface and the capacitance detection device, comprising:

a detection unit in which is arranged a plurality of  
capacitance detection circuits that output the detection signal;  
and

10 an amplification circuit that amplifies the detection  
signal,

wherein:

the capacitance detection circuit comprises a sensor  
electrode for forming a capacitance between the subject surface  
15 and the sensor electrode, a signal output element that outputs a  
detection signal corresponding to the capacitance, and a low  
potential source line that connects to the signal transmission path  
of the detection signal; and

the amplification circuit functions as a signal source for  
20 outputting the detection signal to the capacitance detection  
circuit and is constituted such that the detection signal is  
transmitted from the amplification circuit to the low potential  
source line via the signal output element.

25 2. The capacitance detection device according to claim 1,

wherein:

the detection signal is a current signal; and

the amplification circuit functions as a current source  
that supplies the current signal to the capacitance detection  
5 circuit.

3. The capacitance detection device according to claim 1,  
wherein the amplification circuit is formed outside the formation  
region of the detection unit.

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4. The capacitance detection device according to claim 1,  
further comprising:

a plurality of select lines for selecting the capacitance  
detection circuit; and

15 a plurality of data lines for outputting the detection  
signal from the amplification circuit to the capacitance detection  
circuit,

wherein:

the capacitance detection circuit further comprises a  
20 select transistor that connects to the respective select line and  
is constituted such that the passage and shutoff of electricity  
between the respective data line and signal output element is  
controlled by means of open/close control of the select transistor.

25 5. The capacitance detection device according to claim 4,

further comprising:

pre-charging means that pre-charge the data line as a stage prior to outputting the detection signal on the data line.

5        6. The capacitance detection device according to claim 5, further comprising:

pre-charge period setting means for setting the ratio between the pre-charge period, in which the pre-charging means execute data-line pre-charging, and the sensing period, in which  
10 the signal output element outputs the detection signal.

7. The capacitance detection device according to claim 1, wherein:

the signal output element is constituted as a  
15 three-terminal transistor having a current control terminal, a current input terminal, and a current output terminal, and further comprises potential control means for controlling the potential of the current control terminal to a predetermined potential as a stage prior to outputting the detection signal corresponding to  
20 the capacitance.

8. The capacitance detection device according to claim 1, wherein:

the capacitance detection circuit further comprises a  
25 reference capacitance of a fixed capacitance value; and

the signal output element outputs a detection signal that corresponds to the capacitance ratio between the capacitance and the reference capacitance.

5        9. The capacitance detection device according to claim 1, wherein the capacitance detection circuit is formed on an insulating substrate.

10       10. A fingerprint sensor that comprises the capacitance detection device according to claim 1 and is constituted to read fingerprint asperity information.

11. A biometrics authentication device that comprises the fingerprint sensor according to claim 10.

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12. A drive method for a capacitance detection device that comprises a current amplification element that increases or reduces the gain of a current signal in response to the capacitance formed between the capacitance detection device and a subject  
20 surface; a data line for supplying the current signal to the current amplification element; an amplification circuit that amplifies the current signal flowing through the data line; a select transistor that controls the passage and shutoff of electricity between the data line and the current amplification element; and a low  
25 potential source line that connects to the output path of the

current signal, the drive method comprising the steps of:

electrically shutting off the data line and the current amplification element from each other by closing the select transistor;

5 pre-charging the data line to a predetermined potential;

allowing electrical conduction between the data line and the current amplification element by opening the select transistor after the data-line pre-charging is complete;

and performing sensing by supplying a current signal from the  
10 amplification circuit to the current amplification element via the data line and amplifying the current signal by means of current gain that corresponds to the capacitance.

13. The drive method for the capacitance detection device  
15 according to claim 12, wherein the ratio between the period for executing the pre-charging step and the period for executing the sensing step is variable.